

## Antioxidative effects of germinated brown rice-derived extracts on H<sub>2</sub>O<sub>2</sub>-induced oxidative stress in HepG2 cells

### ABSTRACT

The antioxidant properties of germinated brown rice (GBR) are likely mediated by multiple bioactives. To test this hypothesis, HepG2 cells pretreated with GBR extracts, rich in acylated steryl glycoside (ASG), gamma amino butyric acid (GABA), phenolics or oryzanol, were incubated with hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) and their hydroxyl radical (OH•) scavenging capacities and thiobarbituric acid-reactive substances (TBARS) generation were evaluated. Results showed that GBR-extracts increased OH• scavenging activities in both cell-free medium and posttreatment culture media, suggesting that the extracts were both direct- and indirect-acting against OH•. The levels of TBARS in the culture medium after treatment were also reduced by all the extracts. In addition, H<sub>2</sub>O<sub>2</sub> produced transcriptional changes in p53, JNK, p38 MAPK, AKT, BAX, and CDK4 that were inclined towards apoptosis, while GBR-extracts showed some transcriptional changes (upregulation of BAX and p53) that suggested an inclination for apoptosis although other changes (upregulation of antioxidant genes, AKT, JNK, and p38 MAPK) suggested that GBR-extracts favored survival of the HepG2 cells. Our findings show that GBR bioactive-rich extracts reduce oxidative stress through improvement in antioxidant capacity, partly mediated through transcriptional regulation of antioxidant and prosurvival genes.

**Keyword:** Germinated brown rice (GBR); Antioxidant properties; Bioactives; Oxidative stress